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Applicability of Malaysian Standards and Universal Design in Public Buildings in Putrajaya

Syazwani Abdul Kadir* and Mariam Jamaludin

Faculty of Architecture, Planning & Surveying, Universiti Teknologi MARA, 40450, Shah Alam, Selangor, D.E., Malaysia

Abstract

This paper discusses an on-going research on universal design implementation in public buildings in Putrajaya with the applicability to Malaysian Standards of accessibility. The areas of study include disability and accessibility issues, current accessibility system in Malaysia, Malaysian Standards and universal design implementation in built environment, and the importance of public buildings in Putrajaya. Site observation involving facilities measurement and photographic documentation was conducted in five significant public buildings in this city. The findings of this study may be used as reference to designers and building managements in providing adequate accessible facilities for the buildings' visitors.

Keywords: Persons with disabilities; Malaysian Standards for accessibility; barrier-free/universal design

1. Introduction

Accessibility in built environment has been a significant issue discussed by architecture researchers as well as disability scholars around the world. Many studies stress on the vulnerability of inaccessible

* Corresponding author. Tel: +6-019-636-4826.
E-mail address: syazwani@uwalumni.com.

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environment to the disabled people which highlights the importance of user-friendly or barrier-free environment in today's world (Carr, Francis, Rixlin and Stone, 1992; Zola, 1993; Chapireau and Colvez, 1998; Antonak and Livneh, 2000; Haq, 2003; Putnam, Greenen, Powers, Saxton, Finney and Dautel, 2003; Metts, 2004). Numerous studies which assess the design for less-able group in architecture have also been conducted in many countries including Malaysia (Blanck, Schur, Kruse, Schwochan and Song, 2003; Darcy and Harris 2003; Kozey and Das, 2004; Thapar, Warner, Drainoni, Williams, Ditchfield, Wierbicky and Nesathurai, 2004; Wiman and Sandhu, 2004; Head and Baker, 2005; Abdul Rahim, 2006; Saito, 2006; Rashid, Hussain and Yusuff, 2008; Abd Shukor and Othman, 2010; Jamaludin, Mohd Ali and Mohamad, 2010). These studies have contributed to the improvement of global accessibility system in developed countries as well as developing countries.

Malaysia has also shown some developments in catering the need of persons with disabilities (PWD). Nevertheless, as appealed by Kamal Malhotra, the United Nations Resident Coordinator, in the National Conference on "Accessibility and Universal Design: Implications for Public Transport and the Built Environment", yet, there are the need to efficiently implement universal design in Malaysia, the need for more professionals or researchers in this area, and the need to revisit the current standards codes (Malhotra, 2010). Thus, this study is called to enhance and complement the precedent studies that have been done on Malaysian accessibility issues and universal design implementation in public buildings.

The present study assessed the design of accessibility in five significant public buildings of different functions in Putrajaya, using design requirements from the current Malaysian Standards for accessibility; MS 1184: 2002 Code of Practice on Access for Disabled People to Public Buildings, and MS 1331:1993 Code of Practice on Access for Disabled People Outside Buildings; as well as universal design principles. The purpose was to identify whether the accessibility facilities in those public buildings meet the design requirements and guidelines of current Malaysian Standards and universal design principles.

2. Literature Review

2.1. Disability and Accessibility Issues

Based on the International Classification of Functioning, Disability and Health (ICF), World Health Organization (WHO) defines disability as "the outcome or result of a complex relationship between an individual's health condition and personal factors, and the external factors that represent the circumstances in which the individual lives" (2010). The ICF, which is a revision of the International Classification of Impairments, Disabilities and Handicaps (ICIDH) adopt social model in addition to the medical model into its disability components, as illustrated in Table 1.

Table 1. Overview of the ICF Components. Source: WHO, 1999

	BODY FUNCTION AND STRUCTURES	ACTIVITIES	PARTICIPATION	CONTEXTUAL FACTORS
LEVEL OF FUNCTIONING	Body *(body parts)*	Individual *(person as a whole)*	Society *(life situations)*	Environmental Factors*(external influence on functioning)* + Personal Factor*s (internal influence on functioning)*
CHARACTERISTICS	Body function Body structure	Performance of individual's activities	Involvement in life situations	Features of the physical, social, and attitudinal world + Attributes of the person

POSITIVE ASPECTS (FUNCTIONING)	Functional and structural integrity	Activity	Participation	Facilitators
NEGATIVE ASPECTS (DISABILITY)	Impairment	Activity limitation	Participation restriction	Barriers / hindrances

Social model views the exclusion of disabled people from the mainstream as the result of public stereotype and ignorance of their rights and capabilities (Antonak and Livneh, 2000; Meyers, Anderson, Miller, Shipp and Hoenig, 2002; Putnam et al, 2003; Wiman and Sandhu, 2004), inadequate employment opportunity (Jenaro, Mank, Bottomley, Doose, & Tuckerman, 2002), ignorance in the policy making system (Bickenbach et al, 1999; Metts, 2004), and the physical barriers they encounter in built environment (Wiman and Sandhu, 2004). In short, disability is caused by the complex relations between human and the environment, which consist of the various elements of surrounding culture, society, politic, climate, topography, technology and architecture (Meyers et al., 2002). From the social model, it is evident that barrier in architecture is one of the significant factors that contribute to disability situation of persons with impairments. On top of that, some scholars establish that the non-accessible built environment can be seen as major barrier to PWD's well-being (Putnam et al, 2003; Darcy and Harris, 2003). Equally important, Imrie and Hall (2001) argue that policies, practices, and values of professionals who create the built environment are the main contributors to the barriers in architecture.

2.2. Current Accessibility System in Malaysia

Malaysian current disability and accessibility system has shown many improvements since last decades, namely by newly enacted regulations. On November 2001 for instance, the Ministry of Human Resources has established the Code of Practice of Employment of Disabled Person in Private Sector to increase job opportunities for PWD (Baharin, 2008). Malaysia has also established the first right-based legislation for people with disabilities, entitled Persons with Disabilities Act in 2008 (Abd Shukor and Othman, 2010). With the enforcement of this Act, government wishes to provide PWD with better public transport facility, amenities and services, better health, education, information and technology, habilitation and rehabilitation, employment opportunities, as well as improved access to sports, leisure and cultural life activities (The Star, 2010).

Nonetheless, even with the growing numbers of accessibility regulations passed in this nation, the number of existing public buildings that have done modifications as approved by the standards codes is very few (Chen et al, 2007). In addition, some of the modifications are not correctly built according to the codes; therefore they are risky to the users. For examples, the disabled toilet doors that are supposed to open to the outside are mistakenly installed the other way around, and ramps are built too steep, which could be dangerous to the users especially person on a wheelchair (Mahyuni, 2008). Other than the weak law enforcement and negative public response, Malaysian accessibility system also needs to be refined due to the increasing number of registered PWD in Malaysia. According to the Department of Social Welfare (2010), the registered persons with disability in Malaysia have increased from 197,517 persons in 2006 to 248,858 person in 2008, as shown in table 2. The number is expected to increase over time, thus, it is crucial to form a more efficient accessibility system in Malaysia.

Table 2. Registered Persons with Disability Based on Types of Impairment. Source: Department of Social Welfare, 2010

TYPES OF IMPAIRMENT	2006	2007	2008
Visual Impairment	18,258	20,039	22,856
Hearing Impairment	29,522	31,715	34,580
Physical Impairment	66,250	73,559	83,070
Learning Difficulty	76,619	85,812	96,246
Cerebral Palsy	887	1,787	2,890
Others	5,983	7,338	9,216
TOTAL	197,519	220,250	248,858

2.3. Malaysian Standards and Universal Design Implementation in Built Environment

The evaluation instruments of this research include Malaysian Standards for accessibility and universal design. According to the Director of Standards Malaysia, Fadilah Baharin (2008), in her opening speech of the Asian Network on Consumers' Participation in Standardization (ANCO) Workshop on 16 February 2008, the development of Malaysian accessible design standards was started upon "the gazettement of the amendment to the Building By-Laws 1984 under the Street, Drainage and Buildings Act 1974." To date, there are three current accessible design standards in Malaysia; MS 1184: 2002 Code of Practice on Access for Disabled Persons to Public Building (First Revision); MS 1331: 2003 Code of Practice for Access of Disabled Persons Outside Buildings (First Revision); and MS 1183: 1990 Specification for Fire Precautions in the Design and Construction of Buildings Part 8: Code of Practice for Means of Escape for Disabled People. Standards is a crucial instrument in this study because it provides approved guidelines for the design of accessible facilities. Standards can also provide detailed methods and specifications that are too intricate to be consisted in codes regulations.

In addition to Malaysian Standards, universal design is also used as an evaluation instruments of this research because it covers broader range of users. It is also a more cost-effective way in providing barrier-free environment compared to the traditional accessible design which focuses merely to the disabled group. College of Design, North Carolina University (1997) defines Universal Design as the design of products and environment which is usable by all people, to the greatest extent possible, without specialized design for certain group of people. The authors, a working group of architects, product designers, engineers and environmental design researchers, collaborated to establish the principles of universal design to guide a wide range of design disciplines including environments, products and communications. The universal design's objective is to not demystify people's impairment, but rather to avoid such attention to their impairments and minimize public tendency to 'social ostracism' (Imrie and Hall, 2001). It is essential to adapt universal design principles in Malaysian accessibility system so that this nation is in line with other developed countries which provide accessible technologies that efficiently cater the need of all range of users. The seven principles of universal design are described in Table 3 below:

Table 3. The Key Principles of Universal Design. Source: College of Design, North Carolina University

PRINCIPLE	DESCRIPTION
Equitable Use	The design is useful and marketable to people with diverse abilities.
Flexibility in Use	The design accommodates a wide range of individual preferences and abilities.
Simple and Intuitive Use	Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.
Perceptible Information	The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.
Tolerance for Error	The design minimizes hazards and the adverse consequences of accident or unintended actions.
Low Physical Effort	The design can be used efficiently and comfortably and with a minimum of fatigue.
Size and Space for Approach and Use	Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.

2.4. The Importance of Public Buildings in Putrajaya

Malaysian government's decision to built Putrajaya was done to improve quality urban living and environment in the capital city, Kuala Lumpur, and Klang Valley area, by decentralizing the traffic congestion problem and high land value (John, 2006; Siong, 2006). The city of Putrajaya is unique in a way that it portrays the 'Malaysian Modern-Islamic' architecture, yet the architecture and landscape are universal in their outlook (Mustafa, 2009). A survey study on residents' perception of Putrajaya identity found that most respondents indicated buildings as the unique symbols and distinctive identity to Putrajaya (Ismail, Shamsuddin and Sulaiman, 2008). This shows that architecture is the main attraction to the city tourists as well as the residents, thus, it is significant to ensure that public buildings in Putrajaya are user-friendly and free from barriers that may hinder such development of city.

Total area of 9.7% or 1103 acres of the city are located for public facilities for the purpose of sport and recreational, education, religious, health, civic, cultural activities, community halls, information centre and many more (Siong, 2006). Among these places, public buildings take significant portion of the area, thus ensuring good accessibility in the buildings is fundamental to the city's image and functioning. Other than the "Garden, Intelligent City" theme, the city planning was also driven by a "caring society" program which emphasizes on security and barrier-free environment for all. In response to the "caring society" program, Siong (2006) establishes that all buildings in Putrajaya was designed in the accordance to several Malaysian Standards for accessibility; MS 1184:1991 Code of Practice on Access for Disabled People to Public Buildings, and MS 1331:1993 Code of Practice on Access for Disabled People Outside Buildings. However, some revisions have been done to those standards since the first construction commenced in 1996. Therefore, by conducting this research, this study intend to evaluate the accessibility in several public buildings in Putrajaya with the revised MS 1184 and MS 1331, so that any improvements needed can be suggested for future modifications.

3. Methodology

The five public buildings being assessed in this study is chosen according to their significances to public, and the regularity of public visiting in a daily basis. These buildings are the Department of Immigration office, Perdana Leadership Foundation building, Putrajaya Hospital, Putrajaya International Convention Centre, and Tuanku Mizan Zainal Abidin Mosque. Each of them functions differently as a

government administrative office, an educational foundation, a health service centre, a conference or event place, and a worshipping place.

This study's data collection involves site observation of the five public buildings. The main public facilities of each building; parking space, pedestrian walkways, guiding blocks, ramps, main entrance, doors and doorways, corridor and interior pathways, information counter, stairways, elevators, escalators, praying room and ablution area, building's signage, public restroom, and accessible restroom; are measured and evaluated using guidelines from the Malaysian Standards for accessibility; MS 1184: 2002 Code of Practice on Access for Disabled People to Public Buildings, and MS 1331:1993 Code of Practice on Access for Disabled People Outside Buildings; and universal design principles. The checklists of design requirements derived from MS codes and universal design principles are completed based on researcher's measurement and observation of those facilities. Photographic documentation is also taken for further analysis of the current facilities condition. The checklists and photographic documentations were then analyzed qualitatively.

4. Results and Discussions

From site observation checklists, the accessible facilities provided in five buildings in Putrajaya was evaluated and summarized as in Table 4:

Table 4. The buildings' evaluation based on design requirements from MS and Universal Design principles

Buildings	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	Score (out of 75)
Department of Immigration	1	5	4	5	5	5	5	1	4	4	4	3	4	3	4	57
Perdana Leadership Foundation	5	5	5	5	5	5	4	1	4	3	3	3	5	3	4	60
Putrajaya Hospital	3	1	1	1	5	5	5	3	4	4	3	4	5	3	4	51
PICC	3	1	5	4	5	5	5	5	4	4	5	3	5	3	4	61
Tuanku Mizan Mosque	3	5	3	5	5	3	5	1	4	4	4	5	5	3	5	60

Legend:

(a) Parking Space
(b) Pedestrian Walkways
(c) Guiding Blocks
(d) Ramps/ Foot Ramps
(e) Main Entrance
(f) Doors and Doorways
(g) Corridor and Interior Pathways
(h) Information Counter
(i) Stairways
(j) Elevators/Lifts
(k) Escalators
(l) Praying Room and Ablution Area
(m) Overall Building's Signage
(n) Public Restroom
(o) Accessible Restroom

	Score	Description
	5	All requirements met/ Facility is not provided but it is not necessary
	4	Most of the requirements met
	3	Equal proportion of requirements met and not met
	2	Most of the requirements are not met
	1	All requirements are not met/ Facility is not provided even though it is necessary

Among the five buildings, result shows that PICC (scored 61 points over 75) provides better accessibility to public, followed by Tuanku Mizan Mosque (60/75), Perdana Leadership Foundation (60/75), Department of Immigration (57/75), and lastly Putrajaya Hospital (51/75). PICC, Tuanku Mizan Mosque, and Perdana Leadership Foundation meet all the design requirements for 46.67% of their main public facilities, while Department of Immigration and Putrajaya Hospital recorded 33.33% and 26.67%

of their facilities that fulfil all the requirements. The red indicators show Putrajaya Hospital verified to 26.67% of facilities that do not meet all the design requirements, higher than Department of Immigration with 13.33% while the other three buildings do not meet all the design requirements for only one out of the fifteen facilities being evaluated in these buildings. From the result, it is also shown that main entrance provides the most excellent accessibility in all five buildings while the poorest accessibility is recorded for information counter.

In general, major flaws in terms of the accessibility found from this study are shown in the design of guiding blocks, information counter, and ablution area. Guiding blocks are either not provided or incorrectly installed in the exterior area of these five buildings. For instances, guiding blocks with line and dot bearings were incorrectly installed at Tuanku Mizan Mosque and Department of Immigration building. Guiding blocks with line bearings are supposed to show the direction of pathways, however, at Tuanku Mizan Mosque, the lines direct to the wrong ways. Similarly inappropriate, the dot bearings which function as warning signal were installed as all guiding blocks at the Department of Immigration buildings, including guiding blocks that are supposed to show directions to the users. These incorrect installations may risk user's safety and confuse those who are in need of tactile indication to move around. In Putrajaya Hospital case, no guiding blocks are provided even though the parking space and pedestrian pathways are located quite a distance from the main entrance of the building. These inadequate installations of guiding blocks are illustrated as in the pictures below:

Fig. 1. (a) Incorrect installation of lines bearings guiding blocks at Tuanku Mizan Mosque; (b) Dots bearings for all guiding blocks around the Department of Immigration building

Another facility that is lack of accessibility in this study is the information counter. All information counters except the ones in PICC and Putrajaya Hospital are too high for children or people on wheelchair to reach and do not provide space for wheelchair to roll under. This does not meet the design guidelines of MS and universal design which require appropriate height of counter and space to roll underneath the work surface. Information counter is an important facility because it is the first place visitors may approach to get help or get information about the building way findings. If the counter is not reachable by some visitors, it may intimidate them and give a negative first impression of the accessibility of overall building interior.

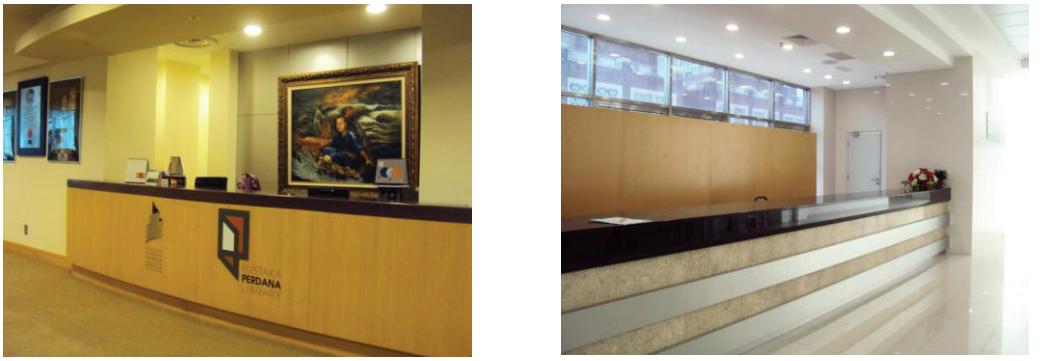

Fig. 2. (a) Information counter in Perdana Leadership Foundation; (b) Information counter in Tuanku Mizan Mosque

Other than guiding blocks and information counter, ablution area is another facility with low accessibility found in this study. Ablution areas in all five buildings except Tuanku Mizan Mosque were built with level changes in front of the water faucets. This hinders less-able people such as wheelchair user, the elderly and crutches user to approach those faucets in order to clean themselves before performing pray.

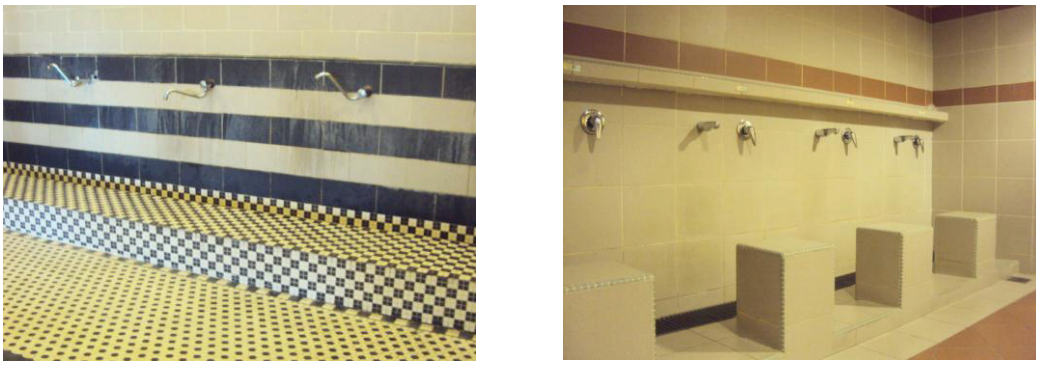

Fig. 3. (a) Ablution area with level changes and confusing floor patterns in Department of Immigration; (b) Ablution area with level changes in PICC

Tuanku Mizan Mosque shows the best solution for the design of accessible ablution area. With no level changes, the design manages to provide accessibility, yet ensure safety by using non-slippery materials for the floor finishes. The ablution areas in Tuanku Mizan Mosque were also provided with good lighting for users' ease of visual access while using the facility.

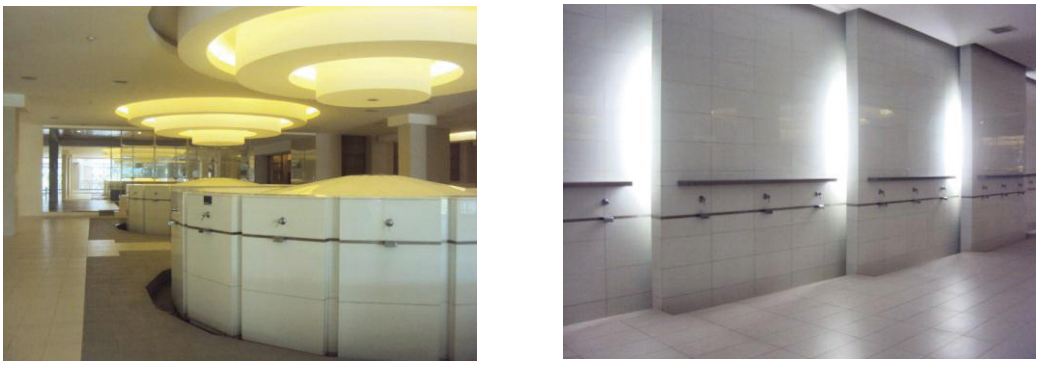

Fig. 4. (a) Accessible ablution area in Tuanku Mizan Mosque; (b) More accessible ablution area with good lighting in Tuanku Mizan Mosque

5. Conclusion and Recommendations

Based on the overall findings, more than half of the main facilities provided in each assessed buildings of this study meet most of the design requirements from MS and universal design principles. Not much huge modifications need to be done to the facilities; however a small modification can contribute to large improvement to the buildings' overall accessibility. In Tuanku Mizan Mosque for example, the buildings doors and doorways can become perfectly accessible if all floor level changes or thresholds are made lower than 10mm. This may give a huge impact to the overall accessibility of the building because there are many unnecessary level changes more than 10mm found in its interior. In addition, modifying this flaw will not impact the aesthetic value of the building's design so much. Other modifications for all buildings can be easily made to most of the facilities with low accessibility such as the guiding blocks, ramps, information counter and ablution area because these facilities are not structural compared to other facilities like stairways, elevators, and interior corridors.

Even though the overall accessibility for most buildings in this study shows satisfactory applicability of Malaysian Standards and universal design implementation, further analysis using different approaches such as facilities simulation, questionnaire survey to facilities' users, and interviews with building managers are needed to strengthen and validate the research's methodology even more. Assessing the accessibility of public buildings in Putrajaya from different perspectives such as user's perception, building manager's view and user's experience may help finding other new and significant recommendations in ensuring a more barrier-free environment in the city.

Note: This paper has been revised from the first originally published.

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